Science and Technology (S&T) Enhances Current Operations

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Not just a theme for the U.S. Army Space and Missile Defense Command (SMDC)/Army Forces Strategic Command, "From Research to Reality — Relevant and Ready" describes how the command enhances current operations and prepares to meet future challenges. SMDC supports and conducts research, development and acquisition (RD&A) activities to support the Army, Missile Defense Agency and U.S. Strategic Command. SMDC's research and development (R&D) mission is focused on S&T to develop and transition technologies and explore alternative concepts to enable Joint warfighting capabilities. SMDC's contributions to current operations include Blue Force Tracking (BFT) and the Humvee Laser Ordnance Neutralization System (HLONS).

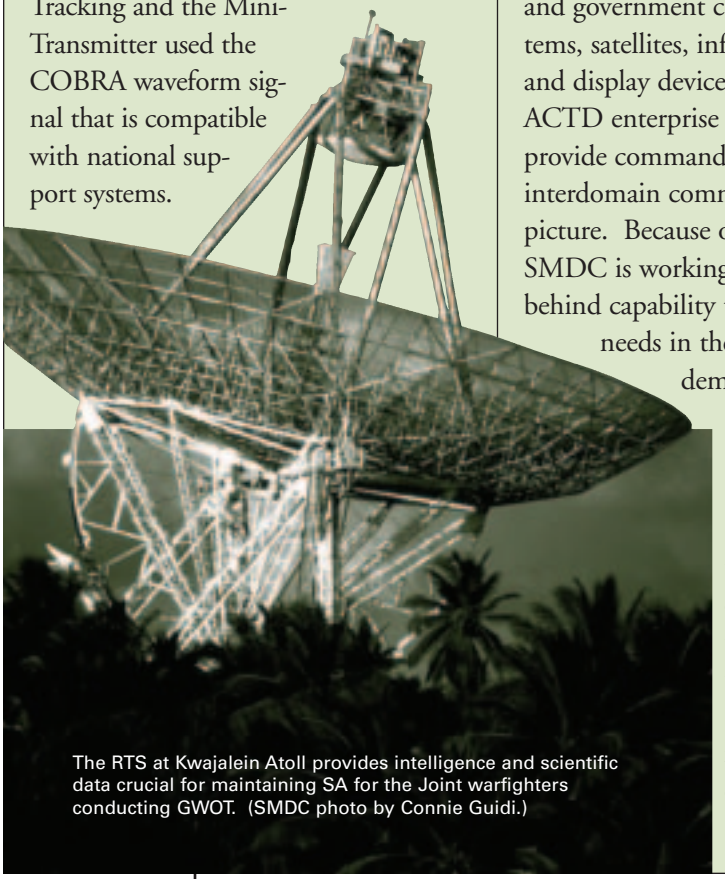
March 18, 2003, marked a pivotal date in the history of directed energy as ZEUS-HLONS became the first high-power laser weapon system to be deployed in a combat zone, supporting *Operation Enduring Freedom (OEF)* in Afghanistan. (Photo courtesy of U.S. Army Space and Missile Defense Command.)

A scientist tests a solid-state heat capacity laser. Directed energy weapons have demonstrated their potential to intercept rockets, mortars and artillery projectiles and small missiles. (Photo courtesy of SMDC.)

Warfighters at all levels must have timely and accurate information on their own location and the locations of friendly and enemy forces. BFT contributed to situational awareness (SA) during the initial phases of *Operation Iraqi Freedom (OIF)*, and has gained acceptance at the tactical and individual Soldier level based on its effectiveness in helping prevent "friendly fire" incidents. At *OIF*'s start, coalition forces arrived in theater with seven distinct BFT systems. The SMDC-developed Grenadier Beyond-Line-of-Sight Reporting and Tracking and the Mini-Transmitter used the COBRA waveform signal that is compatible with national support systems.

The Force XXI Battle Command Brigade and Below used the commercial L-Band system.

The Joint BFT SA Advanced Concept Technology Demonstration (ACTD) is demonstrating how to collect, disseminate, display and improve BFT data. During a recent in-theater demonstration, SMDC integrated the seven different types of BFT technologies, on a variety of platforms, into a single enterprise system. Capitalizing on the potential of a wide range of commercial and government communications systems, satellites, information databases and display devices, the Joint BFT SA ACTD enterprise solution is a way to provide commanders at all levels an interdomain common operational picture. Because of ACTD's success, SMDC is working to field a leave-behind capability to satisfy Joint force needs in the theater where the demonstration occurred.



The RTS at Kwajalein Atoll provides intelligence and scientific data crucial for maintaining SA for the Joint warfighters conducting GWOT. (SMDC photo by Connie Guidi.)

Space Control Operations

SMDC R&D continues to enhance current operations through its assets at the Ronald Reagan Ballistic Missile Defense Test Site (RTS) on the U.S. Army Kwajalein Atoll (see article on Page 75, of May-June 2005 *Army AL&T* Magazine). Intelligence and scientific data is crucial for maintaining SA for the Joint warfighters conducting the global war on terrorism (GWOT). The RTS monitors the sky 24 hours a day providing this invaluable scientific and intelligence information to combatant commanders around the world.

Space control operations provide freedom of action in space for friendly forces while, when directed, denying it to an adversary. Collecting data on foreign space launch vehicles as they make their way to orbit is also a critical part of space surveillance, which supports overall space control. RTS sensors are uniquely suited and regularly tasked to collect critical data on cooperative or noncooperative launches. RTS provides this data to the U.S. Strategic Command, which then provides this information to sensors elsewhere in its Space Surveillance Network, to facilitate collection on the same launch vehicles as they pass other network sensors around the globe.

Looking toward the future, SMDC is actively seeking and developing technologies to ensure that the U.S. military will have the ability to use space assets, while protecting itself from an adversary's potential use of space.

HLONS

HLONS, commonly known as ZEUS, was developed for surface mine and unexploded ordnance neutralization. ZEUS was developed to demonstrate that a moderate-power commercial solid state laser (SSL) and beam control system can be integrated onto a Humvee platform and used to effectively clear surface mines, improvised explosive devices (IEDs), or unexploded ordnance (UXO) from supply routes and minefields.

In December 2002, Army Vice Chief of Staff GEN John M. Keane directed that ZEUS be deployed to Afghanistan to demonstrate its countermine capabilities in a combat environment and educate Soldiers on the revolutionary possibilities of lasers. ZEUS was transported to Afghanistan by March 2003, and neutralized more than 200 munitions of 10 different types before returning to the United States in August 2003. Over its test and deployment history, ZEUS has eliminated more than 1,600 ordnance items of 40 different types with more than a 98-percent success rate.

Recently, a 2-kilowatt (kW) solid-state fiber optic laser was integrated into the system. This new laser significantly reduces the overall system weight and provides increased output beam power, which equates to extended range. ZEUS is currently being prepared for deployment to *OIF* to assist in explosive ordnance disposal activities there.

High Energy Laser Systems Test Facility (HELSTF)

The transformational potential of directed energy weapons (DEW) for the Future Force is being demonstrated today by the SMDC HELSTF. Rockets, mortars and artillery are potent battlefield killers. The HELSTF has successfully conducted live-fire tests of lasers against rockets, small missiles, mortar and artillery projectiles to demonstrate DEW's potential against these types of munitions. Testing at HELSTF is key to providing data to design, build and integrate laser weapons into the Future Force. In addition, the experience in operating and maintaining these high-energy lasers has provided insights into the maintainability and supportability of lasers on the battlefield.

In 2001, the Army initiated an SSL program at the SMDC Tech Center to pursue the development of SSL technology for application as a tactically deployed DEW that would provide the required lethal effects with minimal logistics support. In FY03, the Office of the Secretary of Defense High Energy Laser Joint Technology Office and the U.S. Air Force partnered with the Army to pursue a focused SSL technology effort within DOD to achieve a reasonable goal of 25 kW. The Joint High Power Solid State Laser (JHPSSL) program awarded multiple development contracts to achieve program goals. The next phase of the JHPSSL program will commence in FY06 and will expand on at least two alternative SSL approaches in an attempt to achieve a 100 kW weapons-traceable capability that could easily be modified for tactical system applications.

At weapon power levels, SSLs have the potential to provide paradigm-shifting capabilities by defeating airborne rockets, artillery and mortars, while also defeating surface-based mines, IEDs and UXOs, and by countering electro-optical sensors. This technology supports the Future Force and, more specifically, Future Combat Systems, through its ability to be small, lightweight and operate through all-electric operation. Additional advantages include deep magazines, longer range and the ability to have scalable effects — lethal to nonlethal — on target, on demand.

Space control operations and RTS sensors on Kwajalein Atoll are uniquely suited and regularly tasked to collect critical data on cooperative or noncooperative launches anywhere in the world. (SMDC photo by Connie Guidi.)

SMDC's current RD&A activities support the Army's warfighters on the ground, the Missile Defense Agency's Joint initiatives and the U.S. Strategic Command's combatant commander's battle command positions. (SMDC photo by Connie Guidi.)

SMDC is committed to making its S&T research a reality. By responding to the Joint warfighter's current operational requirements, while also leveraging current experience and operations capabilities, SMDC will ensure that the Army's S&T efforts guarantee U.S. military superiority on future battlefields across the full spectrum of combat operations.

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